Contractor's Report to the Board

Executive Summary

Targeted Statewide Waste Characterization Study:

Detailed Characterization of Construction and Demolition Waste

June 2006

Produced under contract by:

Cascadia Consulting Group

CASCADIA
CONSULTING GROUP

The complete study can be found on the Board's website at
http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1185

California Environmental Protection Agency
Integrated Waste Management Board

Executive Summary

Introduction

In 2004, the California Integrated Waste Management Board (CIWMB) commissioned this study, which quantifies and characterizes four specific waste streams:

1. Disposal and diversion from specific major waste generators in the commercial sector (Task 1);
2. Residuals from materials recovery facilities (MRF) and municipal solid waste processing facilities (clean and dirty MRFs) (Task 2);
3. Disposal from the construction and demolition (C&D) waste stream (Task 3); and
4. Disposal from the commercial self-haul and drop-box waste stream (Task 4).

In contrast to recent statewide studies the CIWMB commissioned in 1999 and 2003, this portion of the current study includes only C&D waste, rather than the commercial, residential, and self-haul waste streams. Also in contrast to the previous studies, the current study focused on waste from four metropolitan areas of the state instead of the entire state.

This report presents the results of the analysis of the C&D waste stream (Task 3). The objectives of this portion of the study were to develop reliable estimates of the quantity and composition of California's C&D waste stream. In addition, a modified version of the C&D visual estimating method used in this study was developed for use by local government staff and published under a separate cover.

Study Methodology

This portion of the study included waste from construction and demolition loads. Disposal facilities were eligible to participate in the study if they were located in one of the four major metropolitan areas: the San Diego area, Southern California/Los Angeles Basin, the San Francisco Bay area, and the Central Valley. Sampling events were divided between the four areas across two seasons (December 2004 and June 2005), so that two sampling days were held in each area in each season. An additional day was added in both the winter season and summer seasons.

The C&D waste stream was divided into seven subsectors based on the type of activity (new construction, remodel, demolition, roofing, and other) and building type (residential, non-residential, and other) that generated the waste. A total of 622 loads of C&D waste were visually characterized according to 86 material types as described in Appendix B. Approximately equal numbers of waste samples were characterized in each metropolitan area.

Concurrent with waste sampling, vehicle surveys were conducted at participating facilities. Data from the surveys were analyzed to estimate the portion of each metropolitan area's waste that corresponds to each waste sector.

Results

Sampling data was compiled to generate composition estimates, while the survey data was used to generate tonnage estimates and to compile overall results for each subsector and metropolitan area. Composition results are presented according to the ***divertibility*** of the materials in question. Material types were assigned to a divertibility category based on available recycling technologies and markets (see Appendix B). Divertibility categories of material include **Recyclable**

Aggregates; **Recyclable Wood**; **Rock, Dirt, & Sand**; **Recyclable Metal**; **Other Recoverable Material;** and **Other MSW**.

The final report includes detailed findings for the following areas:

- Composition and tonnage by material and divertibility category for overall C&D waste.
- Composition and tonnage by material and divertibility category for all seven activity and building type subsectors.
- Composition and tonnage by material and divertibility category for C&D waste in each metropolitan area.

The findings show that approximately 3.1 million tons of C&D waste were disposed in 2004 in the four metropolitan areas (Table 1). The amount of C&D waste disposed was highest in the San Francisco Bay Area, about 1.4 million tons, followed by the Southern California/L.A. Basin, which had an estimated 1.1 million tons disposed in 2004. The largest amount of C&D waste in the San Diego and San Francisco Bay Area was estimated to be residential remodel, although demolition was almost as large in the Bay Area. In the Central Valley, the greatest amount of C&D waste was attributed to new residential construction, followed closely by residential remodel. Other C&D was the largest substream in the Southern California/L.A. Basin.

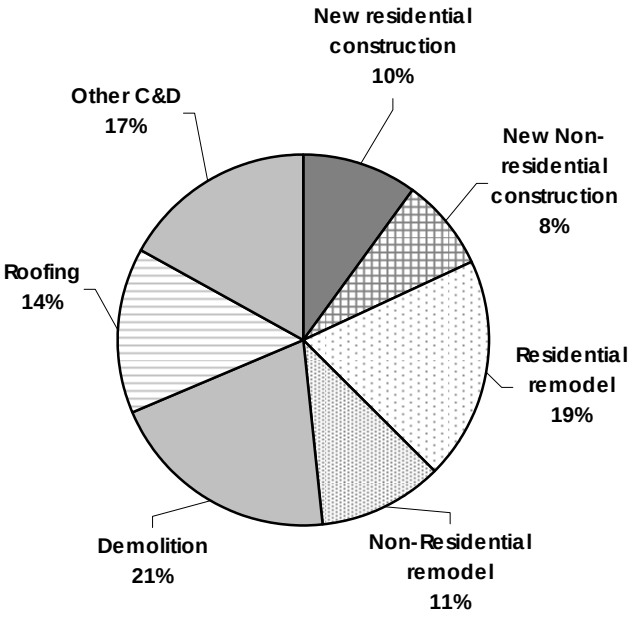
Table 1. Metropolitan Area Tonnages by Subsector, 2005

Subsector	San Diego	Southern California/ L.A. Basin	San Francisco Bay Area	Central Valley	Total
New residential construction	51,515.87	65,416.61	146,049.99	48,835.16	**311,817.64**
New non-residential construction	20,847.16	72,248.53	140,779.24	20,216.50	**254,091.43**
Residential remodel	123,615.00	136,367.12	300,169.61	44,475.53	**604,627.27**
Non-residential remodel	53,053.94	68,362.69	196,488.90	23,202.63	**341,108.15**
Demolition	76,899.84	243,261.99	289,004.55	23,556.01	**632,722.40**
Roofing	26,030.84	182,720.34	209,666.54	34,050.08	**452,467.80**
Other C&D	62,306.77	344,838.60	106,778.00	20,167.38	**534,090.76**
Total	**414,269.43**	**1,113,215.88**	**1,388,936.83**	**214,503.30**	**3,130,925.43**

The above tonnages were calculated by applying 2005 field percentages of each subsector to 2004 Disposal Reporting System tonnage data.

Figure A shows the contribution of each subsector to the overall C&D waste stream. Demolition (21 percent) and residential remodel (19 percent) made up the largest portions of the waste stream. The two new construction categories, new residential and new non-residential, made up the smallest portions of the overall C&D waste stream at 10 percent and 8 percent, respectively.

Figure A. Overview of California's C&D Waste Stream by Subsector, 2005



The composition results for the overall C&D waste stream are shown in Figure B, Table 2, and Table 3. This data reflects the aggregated results from all four metropolitan areas. In terms of the six divertibility categories, recyclable aggregates was calculated to compose about 27 percent of this waste stream. Approximately 74 percent of the total waste stream was estimated to be divertible. The most prominent individual material types were determined to be composition roofing (10.2 percent), remainder/composite C&D (8.3 percent), and large asphalt pavement without re-bar (8.1 percent).

Figure B. Overview of Waste Divertibility: Overall C&D in Four Metropolitan Areas of California, 2005

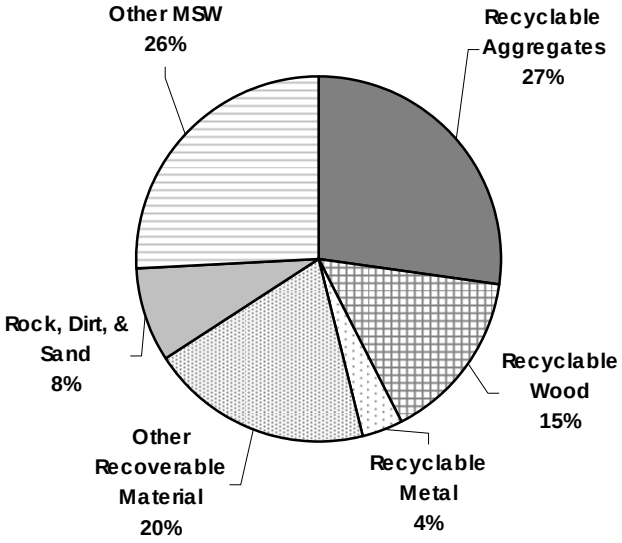


Table 2. Top Ten Disposed Materials: Overall C&D in Four Metropolitan Areas of California, 2005

Material	Divertible	Est. Percent	Cum. Percent	Est. Tons
Composition Roofing	yes	10.2%	10.2%	318,494
Remainder/Composite C&D	no	8.3%	18.5%	261,161
Large Asphalt Pavement without Re-bar	yes	8.1%	26.6%	253,286
Dirt & Sand	yes	6.6%	33.2%	206,729
Other Aggregates	yes	6.4%	39.6%	199,544
Clean Dimensional Lumber	yes	5.9%	45.5%	185,276
Large Concrete without Re-bar	yes	5.2%	50.7%	163,483
Painted/Stained Wood	no	4.6%	55.4%	145,333
Clean Gypsum Board	yes	4.5%	59.8%	140,348
Clean Engineered Wood	yes	4.5%	64.3%	139,975
Total		**64.3%**		**2,013,629**

The figures, when added together, may not exactly match the totals shown, due to rounding.

Table 3. Detailed Waste Composition: Overall C&D in Four Metropolitan Areas of California, 2005

Material	Est. Percent	+ / -	Est. Tons
Paper	**3.2%**		**101,750**
Uncoated Corrugated Cardboard	0.8%	0.2%	24,368
Paper Bags/Kraft	0.1%	0.2%	3,826
Newspaper	0.2%	0.1%	5,664
White Ledger	0.1%	0.1%	2,705
Colored Ledger	0.1%	0.1%	2,795
Other Office Paper	0.0%	0.0%	336
Magazines/Catalogs	0.0%	0.0%	576
Phone Books/Directories	0.0%	0.0%	29
Other Misc. Paper	0.7%	0.2%	22,393
Remainder/Composite Paper	1.2%	0.5%	39,057
Glass	**1.1%**		**34,054**
Clear Glass Bottles & Containers	0.1%	0.0%	1,760
Green Glass Bottles & Containers	0.0%	0.0%	738
Brown Glass Bottles & Containers	0.0%	0.0%	852
Other Colored Glass Bottles & Containers	0.0%	0.0%	3
Flat Glass	0.6%	0.5%	19,615
Remainder/Composite Glass	0.4%	0.2%	11,087
Metal	**4.0%**		**124,719**
Tin/Steel Cans	0.0%	0.0%	645
Major Appliances	0.7%	0.8%	20,486
Used Oil Filters	0.0%	0.0%	0
HVAC Ducting	0.1%	0.1%	3,568
Other Ferrous	2.4%	0.6%	75,108
Aluminum Cans	0.0%	0.0%	161
Other Non-Ferrous	0.4%	0.1%	11,593
Remainder/Composite Metal	0.4%	0.2%	13,158
Electronics	**0.2%**		**5,666**
Brown Goods	0.0%	0.0%	389
Computer-related Electronics	0.0%	0.0%	828
Other Small Consumer Electronics	0.0%	0.0%	1,388
TV's & Other CRTs	0.1%	0.1%	3,062
Plastic	**0.8%**		**24,611**
PETE Containers	0.0%	0.0%	363
HDPE Containers	0.0%	0.0%	1,135
Misc. Plastic Containers	0.0%	0.0%	172
Trash Bags	0.0%	0.0%	1,064
Grocery/ Merch. Bags	0.0%	0.0%	73
Non-Bag Comm./Ind.Packaging Film	0.1%	0.0%	2,255
Film Products	0.1%	0.0%	2,654
Other Film	0.0%	0.0%	428
Durable Plastic Items	0.2%	0.1%	7,270
Expnd. Polystyr. Packaging/Insulation	0.1%	0.0%	2,024
Remainder/Composite Plastic	0.2%	0.1%	7,174
Totals	**100.0%**		**3,130,925**
Sample Count	**622**		

Material	Est. Percent	+ / -	Est. Tons
Organic	**3.0%**		**92,557**
Food	0.0%	0.0%	709
Leaves & Grass	0.5%	0.2%	17,065
Prunings & Trimmings	0.4%	0.2%	13,838
Branches & Stumps	0.1%	0.0%	2,513
Agricultural Crop Residues	0.0%	0.0%	0
Manures	0.0%	0.0%	0
Textiles	0.2%	0.1%	4,716
Carpet	1.0%	0.4%	32,000
Carpet Padding	0.2%	0.1%	6,766
Remainder/Composite Organic	0.5%	0.4%	14,950
Construction & Demolition	**86.7%**		**2,714,783**
Lg Concrete with Re-bar	0.6%	0.3%	19,309
Lg Concrete without Re-bar	5.2%	1.8%	163,483
Sm Concrete with Re-bar	0.7%	0.6%	23,132
Sm Concrete without Re-bar	4.3%	1.2%	134,597
Lg Asphalt Pav. with Re-bar	0.0%	0.0%	719
Lg Asphalt Pav. without Re-bar	8.1%	3.0%	253,286
Sm Asphalt Pav. with Re-bar	0.7%	0.9%	22,022
Sm Asphalt Pav. without Re-bar	1.2%	1.3%	36,115
Composition Roofing	10.2%	2.0%	318,494
Other Asphalt Roofing	4.4%	1.8%	136,756
Other Aggregates	6.4%	2.4%	199,544
Clean Dimensional Lumber	5.9%	1.0%	185,276
Clean Engineered Wood	4.5%	0.8%	139,975
Pallets & Crates	1.8%	0.6%	55,436
Other Recyclable Wood	3.1%	1.2%	95,533
Painted/Stained Wood	4.6%	1.2%	145,333
Treated Wood	0.3%	0.2%	8,254
Clean Gypsum Board	4.5%	1.3%	140,348
Painted/Demolition Gypsum Board	3.6%	1.2%	111,960
Large Rock	0.9%	0.6%	28,063
Small Rock/Gravel	0.7%	0.4%	23,234
Dirt & Sand	6.6%	3.0%	206,729
Fiberglass Insulation	0.2%	0.1%	6,025
Remainder/Composite C&D	8.3%	1.9%	261,161
Household Hazardous Waste	**0.4%**		**11,459**
Paint	0.1%	0.1%	1,912
Vehicle & Equip. Fluids	0.0%	0.0%	0
Used Oil	0.0%	0.0%	0
Batteries	0.3%	0.5%	9,532
Remainder/Composite HHW	0.0%	0.0%	15
Special Waste	**0.6%**		**19,446**
Ash	0.0%	0.0%	0
Sewage Solids	0.0%	0.0%	0
Industrial Sludge	0.0%	0.0%	0
Treated Medical Waste	0.0%	0.0%	0
Bulky Items	0.6%	0.3%	17,974
Tires	0.0%	0.0%	1,214
Remainder/Composite Special	0.0%	0.0%	258
Mixed Residue	**0.1%**		**1,880**
Mixed Residue	0.1%	0.1%	1,880

Confidence intervals calculated at the 90% confidence level. Percentages for material types may not total 100% due to rounding.